(12) UK Patent Application (19) GB (11) 2 351 039 (13) A

(43) Date of A Publication 20.12.2000

(21) Application No 9924305.7

(22) Date of Filing 14.10.1999

(30) Priority Data
(31) 990497 (32) 15.06.1999 (33) IR

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(51) INT CL[7]
B41M 3/00 7/00

(52) UK CL (Edition R)
B6C CSAD C321

(56) Documents Cited
WO 99/24130 A WO 97/43126 A JP 020297482 A
US 4536218 A CA 1190987

(58) Field of Search
UK CL (Edition R) B6C CSAD CSM
INT CL[7] B41M 3/00 7/00
ONLINE DATABASES: WPI, EPODOC, JAPIO

(54) Abstract Title
Printing method

(57) Indicia are lithographically printed on a back face of a carton board. A layer of blister forming ink is then applied to the back face. Indicia are applied to the top face of the board by lithographic printing and a UV curable acrylate varnish is applied over the printed indicia. An opaque UV based scratch-off silver acrylate ink is applied to occlude an image. An anti set-off starch based powder is applied between the sheets. Alternatively or additionally a sheet may be cooled directly by an air stream prior to stacking.

GB 2 351 039 A

"Printing Method"

Introduction

The invention relates to a method of printing in which printed matter is masked by an opaque layer which may be scratched off. More especially the invention relates to the production of pharmaceutical packages in which usage of tablets is tracked by scratching sections on the package.

Heretofore, specialised silk screen printing processes have typically been used. However, one problem with this method is that the printing cycle time is considerably longer than for lithographic printing processes. Also, additional materials handling arises where both silk screen and lithographic processes are used for a particular printed product.

It has also been proposed to use a standard lithographic printing process to produce a scratch-off opaque layer. For example, Canadian Patent Specification No. CA 1190987 describes a process comprising the steps of:-

- preparing a card stock with indicia to be masked;
- applying a varnish-ink formulation over the indicia such that the underlying indicia is visible;
- allowing the varnish-ink formulations to dry and cure for a day;
- applying a masking coat over the cured varnish-ink in four layers wet-on-wet; and
- allowing the masking coat to dry.

PCT Patent Specification No. WO 97/43126 also describes a process in which conventional lithographic printing is used. In this case a wax-like release layer of oleoresinous release varnish is applied on the indicia, and an opaque coating is applied over the release layer.

One of the major problems with such processes, however, is that they are relatively slow and inefficient.

Therefore, the invention is directed towards providing an improved method for efficiently producing high quality products. This is particularly important for applications such as pharmaceutical tablet packaging.

Statements of Invention

According to the invention there is provided a method for producing a printed sheet with an opaque scratch-off section comprising the steps of:-

printing indicia on one face of the substrate sheet;

lithographically applying a UV curable varnish to the printed indicia;

lithographically applying an opaque UV curable scratch-off ink over the varnish; and

stacking the printed sheets thus formed.

In one embodiment of the invention the method includes the step of applying an anti set-off agent to the sheet prior to stacking. Preferably, the anti set-off material is in powder form.

Ideally the anti set-off material is a starch based material.

In a preferred embodiment of the invention the method includes the step of cooling the sheet prior to stacking. Preferably the sheet is cooled by applying a stream of air to the sheet. Ideally the air is chilled to a temperature of less than 20°C.

In a preferred arrangement air is applied over the printed surface of the sheet, prior to stacking.

Preferably the method includes the step of applying a blister-forming ink to the opposite face of the substrate sheet.

In one embodiment of the invention the method includes the step of printing indicia on the opposite face of the substrate sheet.

Ideally indicia are printed on the substrate sheet lithographically.

In a preferred embodiment the UV curable varnish is applied over the printed sections of the board to leave sections of the board between the printed sections which do not have varnish applied.

The invention also provides printed sheets whenever produced by a method of the invention.

Detailed Description

Conventional multi-colour lithographic printing presses are used in the method of the invention.

In a first step a double sided carton board is passed through a printing press to lithographically print indicia on a back face of the carton board. A layer of blister-

forming ink is then applied lithographically to the printed back face of the board. The blister-forming ink is a low wax ink.

The board with the printed and blister layered back face is then passed through a multi-colour lithographic printing press to apply indicia to the top face of the board. In the same pass or another pass a UV curable acrylate varnish is applied over the printed indicia. The layer is an oleoresinous varnish having slip properties so that silver scratch-off ink will key and dry and yet will not oxidise.

The UV curable varnish is applied only over the printed sections on the board. A typical board will have a plurality of such printed sections which are spaced-apart on the board. The UV curable varnish is not applied in the spacing between the printed sections. This is beneficial as it provides unvarnished sections of the sheet which allow the sheets to be more readily stacked and handled generally.

An opaque UV based scratch off silver acrylate ink is then applied lithographically to desired locations on the board. The silver ink occludes the image.

The UV curable varnish and the UV based scratch-off opaque silver ink form, on curing, an effective bond in the form of a complex matrix free of volatiles. The UV curable varnish contains a slip additive which is receptive to the silver opaque ink while allowing the silver ink to be scratched off by a user.

To enhance the curing of the inks and the handling properties of the printed sheets an anti set-off agent is applied to the sheet prior to stacking. The set-off material is preferably in a powder form and is usually a starch-based material.

Alternatively or additionally the sheet may be cooled prior to stacking by applying a stream of air at less than ambient temperature to the sheet. The cooled air stream may be applied over the top face of a sheet as the sheet is being led from the lithographic printing press, for stacking.

The invention provides a highly efficient method for producing a high quality printed sheet with opaque scratch-off sections. The curing time between passes is minimised to less than about 2 hours and the printed sheets are easily stacked and handled generally. Because all layers are applied lithographically the printed sheets are produced highly efficiently.

Many variations on the specific embodiment of the invention described will be readily apparent and accordingly the invention is not limited to the embodiments hereinbefore described which may be varied in detail.

Claims

1. A method for producing a printed sheet with an opaque scratch-off section comprising the steps of:-

printing indicia on one face of the substrate sheet;

lithographically applying a UV curable varnish to the printed indicia;

lithographically applying an opaque UV curable scratch-off ink over the varnish; and

stacking the printed sheets thus formed.

2. A method as claimed in claim 1 including the step of applying an anti set-off material to the sheet prior to stacking.

3. A method as claimed in claim 2 wherein the anti set-off material is in a powder form.

4. A method as claimed in claim 2 or 3 wherein the anti set-off material is a starch based material.

5. A method as claimed in any preceding claim including the step of cooling the sheet prior to stacking.

6. A method as claimed in claim 5 wherein the sheet is cooled by applying a stream of air to the sheet.

7. A method as claimed in claim 6 wherein the air is chilled to a temperature of less than 20°C.

8. A method as claimed in claim 6 or 7 wherein the air is applied over the printed surface of the sheet, prior to stacking.

9. A method as claimed in any preceding claim including the step of applying a blister-forming ink to the opposite face of the substrate sheet.

10. A method as claimed in any preceding claim including the step of printing indicia on the opposite face of the substrate sheet.

11. A method as claimed in any preceding claim wherein indicia are printed on the substrate sheet lithographically.

12. A method as claimed in any preceding claim wherein the UV curable varnish is applied over the printed sections of the board to leave sections of the board between the printed sections which do not have varnish applied.

13. A method for producing a printed sheet substantially as hereinbefore described.

14. Printed sheets whenever produced by a method as claimed in any preceding claim.

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Application No: GB 9924305.7 _8_ **Examiner:** A J Rudge
Claims searched: 1-14 **Date of search:** 29 March 2000

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): B6C(CSM, CSAD,)

Int Cl (Ed.7): B41M-3/00;7/00

Other: Online databases: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	JP2297482 A	(Fukushima) - see online abstract supplied	1 at least
X	CA 1190987 A	(Ganho) - see online abstract supplied	"
Y	WO 99/24130 A	(Pacific) - see abstract at least	"
Y	WO 97/43126 A	(Scupham) - see the whole document	"
Y	US 4,536,218	(Ganho) - see the abstract at least	"

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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